

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2003/001623

**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: F25J 1/00, 1/02, 3/02, 3/04, 3/08, 5/00, F25B 25/02, 27/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC F25J 1/00, 1/02, 3/02, 3/04, 3/08, 5/00, F25B 25/02, 27/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI IPC + KEYWORDS (LNG, methane, natural gas, waste, chill, ammonia, energy, heat, absorb, LPG, load)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2001/88447 A (PHILLIPS PETROLEUM CO.) 22 November 2001 See entire document	1-26
X	WO 2001/46634 A (PHILLIPS PETROLEUM CO.) 28 June 2001 See entire document	1-26
X	WO 2002/086404 A (ELCOR CORPORATION) 31 October 2002 See entire document	1-26

☒ Further documents are listed in the continuation of Box C☒ See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 18 February 2004	Date of mailing of the international search report 25 FEB 2004
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer  R.P. ALLEN Telephone No : (02) 6283 2134

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2357140 A (KVAERNER OIL & GAS A. S.) 13 June 2001 See entire document	1-26
X	WO 2001/49394 A (L'AIR LIQUIDE, SOCIETE ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCEDES GEORGES CLAUDE) 12 July 2001 See entire document	1-26
X	US 6158241 A (ERICKSON) 12 December 2000 See entire document	1-26
X	US 4695303 A (MONTGOMERY IV et al.) 22 September 1987 See entire document	1-24
X	WO 2002/079706 A (ABB LUMMUS GLOBAL INC) 10 October 2002 See entire document	1-14, 24
X	US 4065278 A (NEWTON et al.) 27 December 1977 See entire document	1-12, 24
X	US 2003/0000698 A (LECOMTE) 2 January 2003 See entire document	1-10, 24
X	EP 102087 B (AIR PRODUCTS AND CHEMICALS INC) 30 December 1986 See entire document	1-10, 24
X	GB 1596330 A (CONSTRUCTORS JOHN BROWN LTD et al.) 26 August 1981 See entire document	13-26
X	US 4702819 A (SHARMA et al.) 27 October 1987 See entire document	24-26

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## Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos :  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos :  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

## Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-23 directed towards production of liquefied natural gas.
2. Claims 24-26 directed towards refrigeration during air separation or LPG extraction.

(see reasoning on extra sheet)

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:1-23

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**Supplemental Box**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: II**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-23 directed towards production of liquefied natural gas. It is considered that "chilling pre-treated gas" comprises a first "special technical feature".
2. Claims 24-26 directed towards refrigeration during air separation or LPG extraction. It is considered that "waste heat is utilised" comprises a second "special technical feature".

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

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Information on patent family members

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	0188447	AU	61633/01	BR	0110912	US	6401486
WO	0146634	AU	21029/01	BR	0016564	EG	22805
		US	6289692				
WO	02086404	CA	2443905	EP	1387992	NO	20034658
		US	6526777				
GB	2357140	AU	32505/00	BR	0001769	NO	20002302
WO	0149394	AU	28608/01	CA	2389546	EP	1250185
		FR	2803221	US	2003140653		
US	6158241						
US	4695303	AU	75091/87	BR	8703394	DK	345987
		EP	0252660	JP	63023988	NO	872645
		PT	85252	ZA	8704348		
WO	02079706	CA	2440142	EP	1373815	NO	20033853
		US	2002157538				
US	4065278	AU	30280/77	DE	2749673	FR	2409469
		GB	1545389				
US	2003000698	AU	38249/02	CA	2383283	FR	2824492
		FR	2826371	NO	20022249		
EP	0102087	AR	231349	AU	18692/83	CA	1200191
		ES	8507441	JP	59081483	MX	163352
		NO	833100	US	4445916		
GB	1596330	BE	862384	CA	1083147	DE	2757915
		FR	2376151	JP	53082800	JP	54076599
		NL	7714434	SE	7714769	US	4128646
US	4702819	AU	80061/87	AU	80063/87	AU	80064/87
		EP	0271658	EP	0272391	EP	0272392
		IN	171634	IN	171635	IN	172104
		JP	63161381	JP	63163770	JP	63166402
		NO	875315	NO	875316	NO	875317
		SU	1553018	US	4710214	US	4711651
END OF ANNEX							